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Guidelines No. 3 for Extra-Heavy Oversize/Overweight Permits

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Abstract:	These guidelines apply to the special Oversize/Overweight Permit Vehicles which exceed the weight limits of Categories A, B, and C in the "Guidelines No. 2 for the Special Overweight Permits" [1]. These vehicles would normally fall into Category E and are to be moved only under the restrictions specified in these Guidelines. Evaluation of the permit applications in accordance with the Guidelines will depend upon the bridges and pavements along the specific route but will not require a detailed analytical evaluation of the bridges.
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1/ SCOPE

These guidelines are applicable to the special Oversize/Overweight Permit vehicles which exceed weight limits of Categories, A, B and C in the "Guidelines No. 2 for the Special Overweight Permits" [1]. These vehicles would normally fall in Category E and are to be moved only under certain restrictions, as specified in these Guidelines.

Evaluation of the permit applications in accordance with these Guidelines will depend upon the bridges and pavements along the specified route but will not require a detailed analytical evaluation of the bridges.

Guidelines No. 3 shall not be used in the field offices; rather all permit applications within the scope of these Guidelines shall be referred to the Head Office in Downsview for approval.

2/ INTRODUCTION

Guidelines No. 2 [1] provide weight and dimension limits for Single Trip and Project Permits up to a gross vehicle weight of 70 000 kg; and for Annual Permits with gross vehicle weight up to 64 000 kg. The Guidelines also allow extra-long loads to be moved using the Two Vehicle Concept [2] with a gross vehicle weight up to 120 000 kg. Within these limits, the Guidelines require control on axle weights.

Category E in Guidelines No. 2 allows very heavy loads to be moved which exceed the weight limits specified in the Guidelines. However, approval of permits for these moves requires an analytical evaluation of bridges and pavements en route and strengthening of the bridges, or construction of temporary supports, if necessary. The cost of engineering services, and temporary supports and strengthening are to be borne by the applicant who is also required to place a bond for the fully estimated value of the bridges en route. The procedure is complex, time-consuming and expensive and, in some cases, may lead to unnecessary delay in the proposed move, having adverse economic implications.

It is recognized that some unique extra-heavy moves will undoubtedly require a detailed bridge evaluation and possibly a certain amount of strengthening of bridges en route. However, some other moves in Category E with travel restrictions may not require a time-consuming comprehensive evaluation of the bridges and pavements. These Guidelines No. 3 are intended to further simplify evaluation of these Category E Permits.

For permits which exceed the limits of Guidelines No. 3, the procedure specified for Category E in Guidelines No. 2 is mandatory, and is repeated here:

> "Permits for heavier axle loads and tire pressures require an evaluation of the structural capacity of the pavements on the designated route. The evaluation procedure must be approved by the Ministry. Since pavement capacity changes seasonally, timing of the move is to be carried out as specified by the Ministry.

If bridges are en route, the applicant shall:

a/ hire a Consulting Engineer licensed in the Province of Ontario and approved by the Ministry on a per-case basis. The Consulting Engineer shall evaluate the structures involved in accordance with the Ministry's Regulations, specify conditions of passing (such as travel along centreline of roadway, minimum or maximum speed, exclusive presence, etc.), and design temporary supports and strengthening of structures as required.

b/ submit the above calculations and plans to the Ministry for approval.

c/ bear the cost of engineering services and that of temporary support and strengthening of the structures. Said temporary support and strengthening shall be carried out to the satisifaction of the Ministry.

d/ place a bond for the fully estimated value of the bridges en route.

e/ bear the cost of escorting the move which shall be made under the supervision of the Ontario Provincial Police.

No weight or dimensional limitations are set except those dictated by the load carrying capacity, geometry and traffic conditions of the segment of the highway system involved."

3/ TRAVEL RESTRICTIONS

Various allowances made in these Guidelines are based on one or more of the following travel restrictions:

a/ Slow specified speed when crossing a bridge.

b/ The Permit vehicle to be the only vehicle on the bridge.

c/ Travel along the centreline of the bridge.

d/ Police escort to control other traffic and allow Permit vehicles to fulfil bridge crossing conditions.

4/ MAXIMUM PERMISSIBLE LOAD

4.1/ Pavement Considerations

4.1.1/ Reduced Load Period

During the reduced load period in spring, permit vehicles shall not be allowed to move on highways posted for reduced load. On highways not posted for reduced load, weight limits will be in accordance with the Highway Traffic Act. These limits are:

- Single axle with single tires - 9 000 kg
- Single axle with dual tires - 10 000 kg
- Tire loading - 11 kg/mm of tire width

4.1.2/ Mobile Cranes

Except for moves during the reduced load period when conditions under 4.1.1 apply, with up to 20% increase in tire loading, the maximum permissible tire loading and single axle weight may be taken up to 30% higher than those prescribed in Guidelines No. 2.

4.1.3/ All Other Permits

Applications for all permits other than those covered under sections 4.1.1. and 4.1.2, where permit limits for a single axle and the wheel pressure prescribed in Guidelines No. 2 are exceeded, shall be evaluated on an individual basis.

4.2/ Bridge Considerations

a/ Maximum permissible load on an axle unit or axle group will be:

R x Maximum Permissible Load per Special Permit Tables 2 to 6 of Guidelines No. 2.

where R = Total allowance factor resulting from all specified travel restrictions determined in accordance with Section 4.2.2.

b/ Maximum permissible load on a single axle will be:

$$R \times 15\,000 \text{ kg}$$

c/ Maximum permissible Gross Vehicle Weight will be:

$$R \times W_o$$

where W_o is determined in accordance with Section 4.2.1.

4.2.1/ "MOL" Level

The maximum observed load (MOL) level is given by:

$$W_o = 20.0 + 3.0\ B_m - 0.0325\ B_m^2 \qquad (1)$$

where: W_o is the total weight on a group of axles in 1000 kg, and

B_m is the Equivalent Base Length in metres given by Equations 2, below:

$$B_m = \frac{4\Sigma|P_i X_i|}{\Sigma P_i} - \frac{2(N-1)}{bN}\left[\frac{\Sigma P_i\ X_i}{\Sigma P_i}\right]^2 \qquad (2)$$

where:

P_i = weight on i^{th} axle in kilograms,

X_i = distance of the i^{th} axle from the axle closest to the centre of gravity of the group of axles (in metres)

N = number of axles in the group

b = base length, distance between the first and the last axle of the group, (in metres)

4.2.2/ Load Allowance for Travel Restrictions

For a vehicle subject to travel restrictions, allowable weight on axle units and axle groups and allowable gross vehicle weight may be increased by a factor R [3], applied to the limits prescribed in Guidelines No. 2.

$$R = R_1 R_2 R_3$$

where: R_1 = allowance factor for confidence in Permit Application weight given by 4.2.3.

R_2 = allowance factor when the Permit vehicle is the only vehicle on the bridges, given by 4.2.4.

R_3 = Allowance factor for speed restriction given by 4.2.5.

Values of R in Table 1 in 4.2.6 may be used on primary routes.

4.2.3/ Allowance Factor for Confidence in Permit Application Weights, R_1

The value of R_1 shall not be greater than the following,

if the load to be be moved and its distribution on axles are not accurately known and permit application weights are based on the best estimate; -- 1.00

if the load to be moved is accurately known (guaranteed, certified, etc.) but axle weights in the permit application are based on an estimate of load distribution;

for axle weights -- 1.05

for gross vehicle weight — 1.10

if permit application weights are based on actual weight and dimension measurements of the loaded transporter. — 1.10

4.2.4/ Allowance Factor for Single Vehicle on the Bridges, R_2

The allowance factor R_2 is applicable if it is specified that the permit vehicle will be the only vehicle on a bridge while crossing it.

a/ When the vehicle occupies and travels in a single travelled lane, the allowance factor R_2 shall not be taken greater than the value given by Figure 1 for the type of bridge structure along the route.

b/ When the vehicle is required to travel down the centreline of the bridges, or when the vehicle will straddle two or more travelled lanes by virtue of its width or width of the load, or is otherwise required to straddle two or more travelled lanes, and provided that an OPP escort is used to ensure compliance with the travel restrictions, the allowance factor R_2 shall not be taken greater than the value given by Figure 2 for the type of bridge structure along the route. If an OPP escort is not provided, the allowance factor R_2 shall not be taken greater than the value given by Figure 1 for the type of bridge structure along the route.

4.2.5/ Allowance for Slow Speed, R_3:

The value of R_3 shall not be taken greater than the following,

1.00 -- for specified speed > 40 km/h
1.04 -- for 40 km/h ≥ specified speed > 25 km/h
1.08 -- for 25 km/h ≥ specified speed > 10 km/h
1.12 -- for specified speed ≤ 10 km/h

The allowance factor R_3 shall not be taken greater than 1.08 if an OPP escort is not provided.

On an expressway, speed cannot normally be restricted; hence, R_3 shall be taken as 1.00 on an expressway, except under exceptional circumstances.

4.2.6/ Table of R for Practical Use

Table 1 gives values of load allowance factor, R, for permit moves on primary routes. The table is based on the allowance factors described in Sections 4.2.3, 4.2.4 and 4.2.5, combined in accordance with Section 4.2.2.

Table 1/ Load Allowance Factor (R) on Primary Routes

Confidence in Permit Application Weights		Speed Limit Over Bridges (km/h)	OPP Escort	Only Vehicle on the Bridges					
				Travel in Single Lane			Straddle Two or More		
				W = 2.60 m	W = 3.05 m	W = 3.35 m	W = 2.60 m	W = 3.05 m	W = 3.35 m
Load and its Distribution on Axles Not Accurately Known		Over 40	Yes	1.04	1.07	1.09	1.09	1.14	1.17
			No	1.04	1.07	1.09	1.04	1.07	1.09
		Over 25 to 40	Yes	1.08	1.11	1.13	1.13	1.19	1.22
			No	1.08	1.11	1.13	1.08	1.11	1.13
		Over 10 to 25	Yes	1.13	1.15	1.18	1.18	1.23	1.26
			No	1.13	1.15	1.18	1.13	1.15	1.18
		10 or less	Yes	1.17	1.20	1.22	1.22	1.28	1.31
			No	1.13	1.15	1.18	1.13	1.15	1.18
Load to be moved known accurately (guaranteed, certified, etc.) but axle weights based on an estimate of load distribution	AXLE WTS.	Over 40	Yes	1.10	1.12	1.14	1.14	1.20	1.23
			No	1.10	1.12	1.14	1.10	1.12	1.14
		Over 25 to 40	Yes	1.14	1.17	1.19	1.19	1.24	1.28
			No	1.14	1.17	1.19	1.14	1.17	1.19
		Over 10 to 25	Yes	1.18	1.21	1.23	1.24	1.29	1.33
			No	1.18	1.21	1.23	1.18	1.21	1.23
		10 or less	Yes	1.23	1.26	1.28	1.28	1.34	1.37
			No	1.18	1.21	1.23	1.18	1.21	1.23
	GVW	Over 40	Yes	1.15	1.18	1.20	1.20	1.25	1.29
			No	1.15	1.18	1.20	1.15	1.18	1.20
		Over 25 to 40	Yes	1.19	1.22	1.25	1.25	1.30	1.34
			No	1.19	1.22	1.25	1.19	1.22	1.25
		Over 10 to 25	Yes	1.24	1.27	1.29	1.29	1.35	1.39
			No	1.24	1.27	1.29	1.24	1.27	1.29
		10 or Less	Yes	1.29	1.32	1.34	1.34	1.40	1.44
			No	1.24	1.27	1.29	1.24	1.27	1.29
Permit Weights based on actual weight and measurements of the loaded transporter		Over 40	Yes	1.15	1.18	1.20	1.20	1.25	1.29
			No	1.15	1.18	1.20	1.15	1.18	1.20
		Over 25 to 40	Yes	1.19	1.22	1.25	1.25	1.30	1.34
			No	1.19	1.22	1.25	1.19	1.22	1.25
		Over 10 to 25	Yes	1.24	1.27	1.29	1.29	1.35	1.39
			No	1.24	1.27	1.29	1.24	1.27	1.29
		10 or Less	Yes	1.29	1.32	1.34	1.34	1.40	1.44
			No	1.24	1.27	1.29	1.24	1.27	1.29

5/ REFERENCES

[1] Agarwal, A.C., "Guidelines No. 2 for the Special Overweight Permits," TRE-81-04, Policy Planning and Research Division, Ontario Ministry of Transportation and Communications, Downsview, Ontario, Canada, 1981.

[2] Agarwal, A.C., "The Two-Vehicle Concept for Overweight/Oversize Permits," TRE-81-03, Policy Planning and Research Division, Ontario, Canada, 1981.

[3] Bakht, B., and Jaeger, L.G., "A Rational Procedure for Overweight Permits," Transportation Research Record 950, Second Bridge Engineering Conference, Volume 1, pp. 59-70, Transportation Research Board, National Research Council, Washington, D.C. 1984.

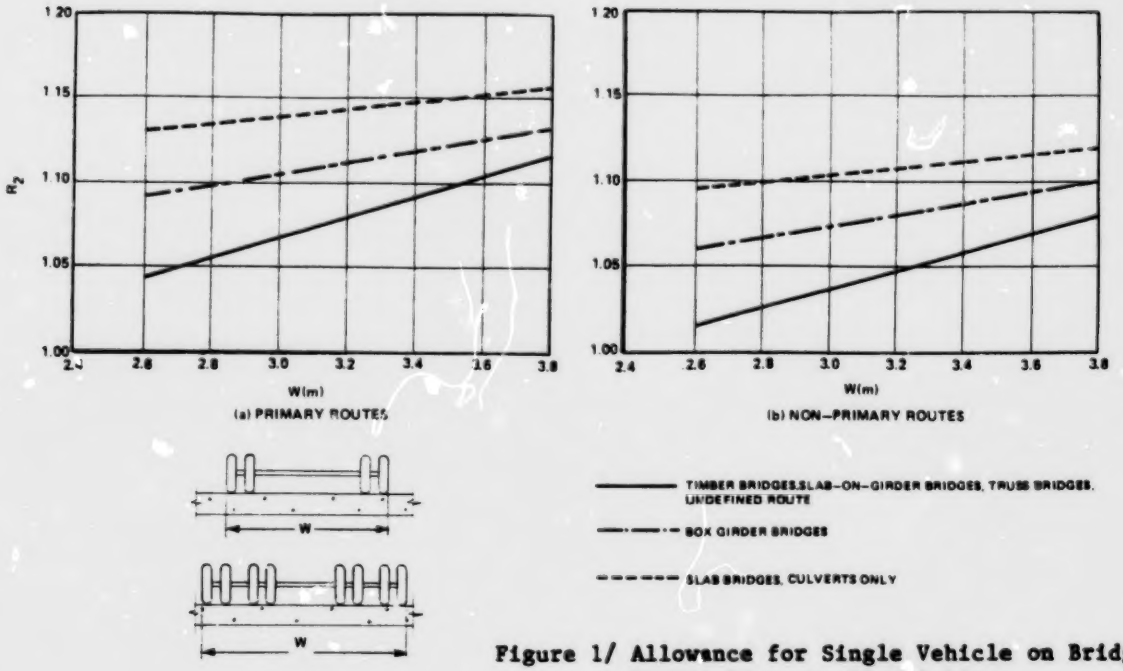

Figure 1/ Allowance for Single Vehicle on Bridge, Travel Down the Travel Lane

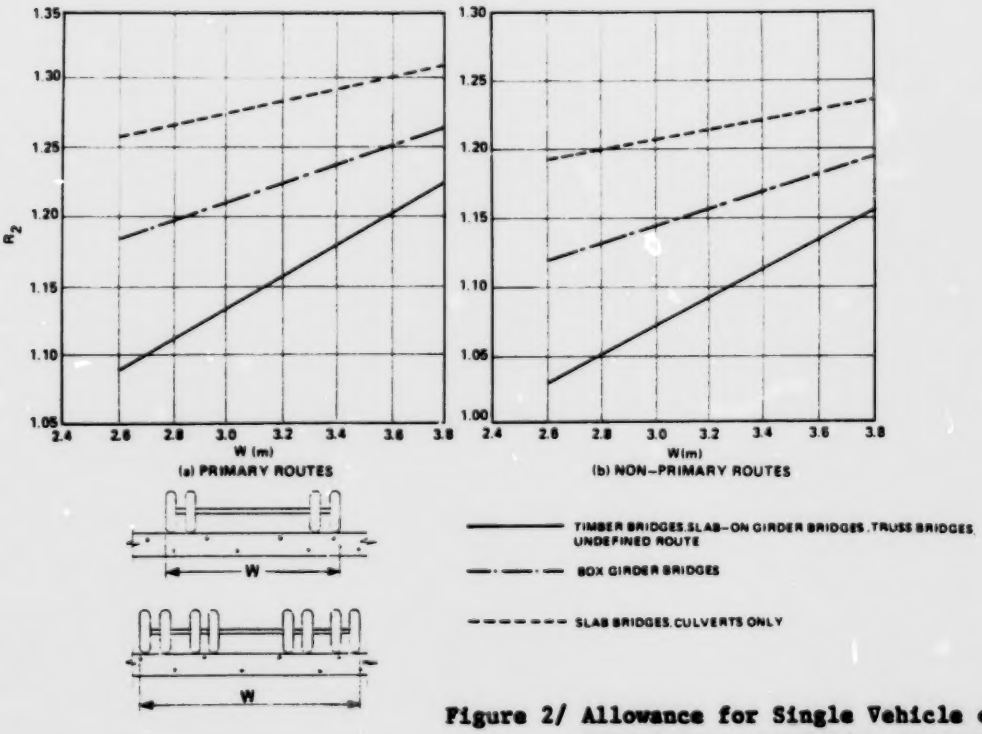

Figure 2/ Allowance for Single Vehicle on Bridge, Travel Down the Bridge Centreline